

# TRAFFIC IMPACT STUDY

*For*

**NAKT Real Estate Holdings, LLC  
Proposed Medical Office Building**

*Property Located at:*

**49 South Avenue West (CR 610)  
Block 473 – Lot 1  
Township of Cranford, Union County, NJ**

Prepared by:



1904 Main Street | 245 Main Street, Suite #110  
Lake Como, NJ 07719 | Chester, NJ 07930  
(732) 681-0760

A handwritten signature in black ink, appearing to read 'NV', written over a horizontal line.

Nick Verderese, PE  
NJ PE License #38991

A handwritten signature in black ink, appearing to read 'Justin P. Taylor', written over a horizontal line.

Justin P. Taylor, PE, PTOE  
NJ PE License #45988

February 25, 2022

4087-99-001T

## INTRODUCTION

It is proposed to construct a medical office building on a parcel of land previously developed with a gas station with service bays, located in the southeast quadrant of the intersection of South Avenue West (CR 610) and Lincoln Avenue West (NJ Route 59) in the Township of Cranford, Union County, New Jersey (see Figure 1 in Appendix A). The site is designated as Block 473 – Lot 1 on the Township of Cranford Tax Maps. It is proposed to raze the existing site and construct a two-story medical office building, with a total size of 5,802 SF (The Project). The site is located within the ORC – Office Residential Character District. Access to the site is currently provided via two (2) full movement driveways along South Avenue West and two (2) full movement driveways along Lincoln Avenue West. It is proposed to close the existing access points and construct a new full movement driveway along South Avenue West and a new full movement driveway along Lincoln Avenue West.

Dynamic Traffic LLC has been retained to prepare this study to assess the traffic impact associated with the construction of The Project on the adjacent roadway network. This study documents the methodology, analyses, findings and conclusions of our study and includes:

- A detailed field inspection was conducted to obtain an inventory of existing roadway geometry, traffic control, and location and geometry of existing driveways and intersections.
- Existing traffic data was collected via manual turning movement (MTM) counts during the weekday AM and weekday PM peak periods at the intersection of South Avenue West (CR 610) and Lincoln Avenue West (NJ Route 59).
- Projections of traffic to be generated by the proposed development were prepared utilizing trip generation data as published by the Institute of Transportation Engineers. Site traffic was then assigned to the adjacent street system based upon the anticipated directional distribution.
- Capacity analyses were conducted for the Existing, No Build, and Build conditions for the study intersections.
- The proposed points of ingress and egress were inspected for adequacy of geometric design, spacing and/or alignment to streets and driveways on the opposite side of the street, relationship to other driveways adjacent to the development, and conformance with accepted design standards.
- The site plan as designed was reviewed for sufficiency in accommodating large wheel base vehicles such as delivery trucks, refuse trucks, and emergency vehicles.
- The parking layout and supply was assessed based on accepted design standards.

## **EXISTING CONDITIONS**

A review of the existing roadway conditions near the proposed site was conducted to provide the basis for assessing the traffic impact of the development. This included field investigations of the surrounding roadways and intersections, collection of traffic volume data, and extensive analyses.

### **Existing Roadway Conditions**

The following are descriptions of the roadways in the study area:

South Avenue West (CR 610) is an Urban Minor Arterial roadway under Union County jurisdiction with a general east/west orientation. In the vicinity of the site the posted speed limit is 35 MPH and the roadway provides one travel lane in each direction. On-street parking is prohibited along both sides of the roadway. Curb and sidewalk are provided along both sides of the roadway. South Avenue West provides a straight horizontal alignment and a relatively flat vertical alignment.

Lincoln Avenue West (NJ Route 59) is an Urban Major Collector roadway under New Jersey Department of Transportation (NJDOT) jurisdiction to the north of the intersection with South Avenue West and under the Township of Cranford jurisdiction to the south of the intersection with South Avenue West. In the vicinity of the site the posted speed limit is 25 MPH and the roadway provides one travel lane in each direction with a general north/south orientation. On-street parking is prohibited along the western side of the roadway in the vicinity of the site. Curb and sidewalk are provided along both sides of the roadway. Lincoln Avenue West provides a straight horizontal alignment and a relatively flat vertical alignment.

### **Existing Traffic Volumes**

Manual turning movement (MTM) counts were conducted on Tuesday, January 11, 2022 from 7:00 to 9:00 AM and from 4:30 to 6:30 PM at the intersection of South Avenue West (CR 610) and Lincoln Avenue West. Review of the collected traffic data reveals that the weekday morning peak street hour (PSH) occurs between 7:30 – 8:30 AM and the weekday evening PSH occurs between 4:45 – 5:45 PM. Figure 2, located in Appendix A, shows the existing peak hour traffic volumes at the study intersections. All traffic counts are contained in Appendix B.

### **COVID-19 Traffic Count Normalization**

It should be noted that various protocols associated with the COVID-19 pandemic were in effect as of the time of the traffic counts. As a result, current traffic volumes on the surrounding roadways may be atypical at this time and not entirely representative of “existing” traffic conditions. Therefore, historical traffic volume data has been reviewed and compared with current traffic volumes in order to account for this effect. Specifically, this firm conducted traffic counts at the intersection of South Avenue West and Lincoln Avenue West in October 2018 which were utilized for the following comparison.

In order to perform an appropriate comparison, the 2018 volumes were increased to better represent 2022 conditions by applying a growth rate of 1.0% for the first three (3) years obtained from the NJDOT Annual Background Growth Rate Table and 0.50% for the last year, for an overall growth rate of 3.5% over the four years. The adjusted 2018 traffic volumes were then compared to the existing 2022 traffic counts as summarized in the table below.

**Table I  
Traffic Count Comparison**

Intersection	Date	Intersection Peak Hour Traffic Volume				COVID-19 Adjustment Factor	
		As-Counted		With Background Growth <sup>[1]</sup>		AM	PM
		AM	PM	AM	PM		
South Avenue West (CR 610) & Lincoln Avenue West	October 2018	1,916	2,362	1,983	2,445	1.20	1.22
	January 2022	1,646	2,012	1,646	2,012		

<sup>[1]</sup> 2018 data increased by applying a growth rate of 1.0% for the first three (3) years per NJDOT Annual Background Growth Rate Table and 0.50% for the last year, for an overall growth rate of 3.5% over the four years.

As seen above, the current traffic volumes were found to be lower during the weekday AM and weekday PM peak hours; therefore, adjustment factors of 1.20 and 1.22 were applied to the weekday AM and weekday PM peak hour volumes, respectively, to provide a conservative analysis. Figure 3, located in Appendix A, shows the adjusted existing peak hour traffic volumes at the study intersections. The 2018 traffic counts are contained in Appendix B.

### Existing Capacity Analysis

The methodology utilized in the capacity analyses is described in the *Highway Capacity Manual*, published by the Transportation Research Board. In general, the term Level of Service (LOS) is used to provide a “qualitative” evaluation of capacity based upon certain “quantitative” calculations related to empirical values, such as traffic volume and intersection control.

At signalized intersections, factors that affect the various approach capacities include width of approach, number of lanes, signal “green time”, turning percentages, truck volumes, etc. However, delays cannot be related to capacity in a simple one-to-one fashion. For example, it is possible to have delays in the Level of Service “F” range without exceeding roadway capacity. Substantial delays can exist without exceeding capacity if one or more of the following conditions exist: long signal cycle lengths; a particular traffic movement experiences a long red time; or progressive movement for a particular lane group is poor. Table II describes the level of service ranges for signalized intersections.

An unsignalized (STOP sign controlled) driveway or side street along a through route is seldom critical from an overall capacity standpoint, however, it may be of great significance to the capacity of the minor cross-route, and it may influence the quality of traffic flow on both. When analyzing an unsignalized intersection, it is assumed that both the major street through and right turn movements are unimpeded and have the right-of-way over all side street traffic and left turns from the major street. All other turning movements in the intersection cross, merge with, or are otherwise impeded by major street movements. Traffic delays at unsignalized intersections are determined by sequentially processing these impeded movements. Table III describes the level of service ranges for unsignalized (stop controlled) intersections.

**Table II  
Level of Service Criteria  
for Signalized Intersections**

Level of Service	Average Control Delay (seconds per vehicle)
A	0.0 to 10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	greater than 80.0

**Table III  
Level of Service Criteria  
for Unsignalized Intersections**

Level of Service	Average Control Delay (seconds per vehicle)
a	0.0 to 10.0
b	10.1 to 15.0
c	15.1 to 25.0
d	25.1 to 35.0
e	35.1 to 50.0
f	greater than 50.0

It should be noted that the analyses within the *Highway Capacity Manual* assume a random arrival for all the movements, which may not be the case if an adjacent traffic signal is present that platoons vehicles such as the signalized intersection of South Avenue West (CR 610) and Lincoln Avenue West (NJ Route 59).

All capacity analyses were performed utilizing Synchro 11 software. It should be noted that the existing percentage of trucks and peak hour factors were used in the existing analysis. Table IV summarizes the existing levels of service (LOS) and delays. All capacity analysis calculation worksheets are contained in Appendix C.

**Table IV  
Existing Levels of Service**

Intersection	Direction/ Movement		AM PSH	PM PSH
	South Avenue West (CR 610) & Lincoln Avenue West (NJ Route 59)	EB	LTR	C (33)
WB		LTR	B (13)	B (15)
NB		L	C (22)	D (37)
		TR	C (30)	C (26)
SB		L	C (30)	C (27)
		TR	C (23)	C (28)
<b>Overall</b>		<b>C (24)</b>	<b>C (23)</b>	

A (#) - Signalized Intersection Level of Service (seconds of delay per vehicle)

The following is a discussion pertaining to the existing intersection analyzed.

**South Avenue West (CR 610) & Lincoln Avenue West (NJ Route 59)**

Lincoln Avenue West (NJ Route 59) intersects South Avenue West (CR 610) to form a four-leg intersection controlled by a traffic signal. This intersection is under the jurisdiction of the NJDOT. The signal timing directive was obtained from the New Jersey Department of Transportation which indicates that a two-phase 70 second background cycle is utilized (the traffic signal timing directive is included in Appendix B). Both the eastbound and westbound approaches of South Avenue West (CR 610) provide a shared left turn/through/right turn lane. Both approaches of Lincoln Avenue West provide a dedicated left turn lane and a shared through/right turn lane.

A review of the existing analysis reveals that the overall intersection operates at level of service “C” and all movements operate at levels of service “D” or better during the analyzed peak periods. See Table IV for the individual movement levels of service and delays.

## FUTURE CONDITIONS

Traffic volumes and operational analyses were developed for both the 2024 No Build and Build conditions. The No Build conditions provide a baseline for assessing the impact of the site development traffic on the roadway system. The process of developing the No Build and Build traffic volumes and the subsequent analyses is outlined below.

Regardless of whether the subject site is developed or not, traffic volumes on the surrounding roadways are expected to increase as a result of developments throughout the region. A growth rate for roadways within the study area was obtained from the NJDOT Annual Background Growth Rate Table, which indicates a growth rate of 1.0% per year.

Through consultation with the Township of Cranford there are no developments in the vicinity of the site that have been approved but not yet constructed. Through consultation with the Township of Garwood Planning Board staff, there are three developments in the vicinity of the site that have been approved but not yet constructed that are identified as potential significant traffic generators, shown below. The Adjacent Development Traffic Volumes passing the site are shown on Figures 4-6 in Appendix A. It was assumed that the background growth rate of 1.0% for two years is adequate to account for the traffic associated with all developments not listed hereafter.

- **Garwood Station – Phase 1**  
A mixed-use development consisting of 298 residential units, 2,867 SF of office space, and 19,115 SF of retail space known as Garwood Station (Phase 1), located at 400 South Avenue (CR 610), has been approved. Projections of the associated traffic volumes were gathered from the *Traffic Impact Study*, prepared by Stonefield Engineering & Design, LLC, dated January 19, 2018. (Figure 4)
- **Garwood Station – Phase 2**  
A residential development consisting of 72 residential units known as Garwood Station (Phase 2), located in the southeast quadrant of the intersection of South Avenue and West Street, has been approved. Projections of the associated traffic volumes were gathered from the *Traffic Impact Study*, prepared by Stonefield Engineering & Design, LLC, dated May 18, 2018. (Figure 5)
- **75 – 93 North Avenue – Garden Homes**  
A residential development consisting of 124 residential units located at 75-93 North Avenue, has not yet been approved, however, conservatively was considered for the purposes of the analyses contained herein. Projections of the associated traffic volumes were developed using ITE research data under LUC 221 – Multifamily Housing (Mid-Rise). (Figure 6)

Future 2024 No Build traffic volumes were developed by applying the background growth rate of 1.0% for two (2) years to the study area roadways existing traffic volumes and adding the adjacent development traffic volumes. Figure 7, in Appendix A, shows the 2024 No Build traffic volumes.

### Traffic Generation

Trip generation projections for The Project were prepared utilizing trip generation research data as published under Land Use Code 720 – Medical-Dental Office Building in the Institute of Transportation Engineers’ (ITE) publication, *Trip Generation, 11<sup>th</sup> Edition*. This publication sets forth trip generation rates based on empirical traffic count data conducted at numerous research sites. Table V details the traffic volumes associated with the subject project.

**Table V**  
**ITE Trip Generation**

Land Use	AM PSH			PM PSH		
	In	Out	Total	In	Out	Total
5,802 SF Medical Office	15	4	19	6	14	20

Once the magnitude of traffic to be generated by the site is known, it is necessary to assign that traffic to the adjacent street system. The distribution of new traffic to the surrounding roadways is based on the location of primary arterial roadways, major signalized intersections and existing traffic patterns. Figures 8 and 9, located in Appendix A, illustrate the Site Generated Traffic Trip Distribution and the Site Generated Volumes, respectively. The Site Generated Volumes assigned to the study area network were added to the No Build traffic volumes to generate the Build traffic volumes, which are shown in Figure 10.

### Future Capacity Analysis

Operational conditions at the study intersections were analyzed under the No Build and Build conditions and are summarized in Table VI below.

**Table VI**  
**Future Levels of Service**

Intersection	Direction/ Movement		AM PSH		PM PSH	
			No Build	Build	No Build	Build
South Avenue West (CR 610) & Lincoln Avenue West (NJ Route 59)	EB	LTR	D (52)	D (53)	C (34)	C (34)
	WB	LTR	B (13)	B (13)	B (16)	B (16)
	NB	L	C (22)	C (22)	D (45)	D (45)
		TR	C (31)	C (31)	C (26)	C (26)
	SB	L	D (35)	D (36)	C (28)	C (28)
		TR	C (23)	C (23)	C (28)	C (29)
<b>Overall</b>			<b>C (31)</b>	<b>C (31)</b>	<b>C (26)</b>	<b>C (26)</b>
South Avenue West (CR 610) & Site Driveway	WB	L	-	a (9)	-	a (9)
	NB	LR	-	c (21)	-	d (27)
Lincoln Avenue West & Site Driveway	WB	LR	-	c (17)	-	c (18)
	SB	L	-	a (9)	-	a (8)

a (#) - Unsignalized Intersection Level of Service (seconds of delay per vehicle)

A (#) - Signalized Intersection Level of Service (seconds of delay per vehicle)



### **South Avenue West (CR 610) & Lincoln Avenue West (NJ Route 59)**

With the addition of site generated traffic, the intersection is anticipated to continue to operate at overall level of service “C” which is similar to the No Build condition. Additionally, each movement is anticipated to continue to operate at levels of service “D” or better with little to no change in delays between the No Build and Build conditions during the analyzed peak hours. See Table VI for the individual movement levels of service and delays.

### **South Avenue West (CR 610) & Site Driveway**

The site driveway is proposed to intersect South Avenue West (CR 610) to form an unsignalized T-intersection with the northbound approach of the site driveway operating under stop control. This intersection is under the jurisdiction of Union County. The eastbound approach of South Avenue West (CR 610) is proposed to provide a shared through/right turn lane, while the westbound approach is proposed to provide a shared left turn/through lane. The northbound approach of the site driveway is proposed to provide a shared left turn/right turn lane.

As designed, all ingress movements from South Avenue West (CR 610) are anticipated to operate at level of service “A”, while all egress movements from the driveway are anticipated to operate at levels of service “D” or better during the studied peak hours. See Table VI for the individual movement levels of service and delays.

### **Lincoln Avenue West & Site Driveway**

The site driveway is proposed to intersect Lincoln Avenue West to form an unsignalized T-intersection with the westbound approach of the site driveway operating under stop control. This intersection is under the jurisdiction of the Township. The northbound approach of Lincoln Avenue West is proposed to provide a shared through/right turn lane, while the southbound approach is proposed to provide a shared left turn/through lane. The westbound approach of the site driveway is proposed to provide a shared left turn/right turn lane.

As designed, all ingress movements from Lincoln Avenue West are anticipated to operate at level of service “A”, while all egress movements from the driveway are anticipated to operate at levels of service “C” or better during the studied peak hours. See Table VI for the individual movement levels of service and delays.

## **SITE PLAN**

### **Site Access and Circulation**

The site plan was reviewed with respect to the site access and on-site circulation design. As noted previously, the multiple driveways along both South Avenue West (CR 610) and Lincoln Avenue West will be consolidated into a new full movement driveway along South Avenue West (CR 610) and a new full movement driveway along Lincoln Avenue West.

The parking lot will be serviced by drive aisle widths of at least 24', which satisfies the Ordinance's requirement of 24'. These drive aisles will allow for two-way circulation and 90 degree parking. Review of the site plan design indicates that the site can sufficiently accommodate the large wheel base vehicles anticipated, such as single unit trucks (SU-30), refuse and emergency vehicles.

Note that clear sight lines exist along both South Avenue West (CR 610) and Lincoln Avenue West for access to/from the site.

### **Parking**

The Township of Cranford Ordinance sets forth a parking requirement of 1 parking space per 200 SF of net floor area for health care facility or clinic uses. Note that the Ordinance defines net floor area as the gross floor area minus 15%. This equates to a parking requirement of 25 spaces for the proposed 5,802 SF gross floor area (4,932 SF net floor area) medical office building. The site as proposed provides 23 parking spaces (inclusive of 1 handicap space). Consequently, the Ordinance parking requirements are not met and a variance is requested.

It should be noted that ITE identifies a peak parking demand of 3.23 spaces per 1,000 SF for LUC 720 – Medical-Dental Office Building. This equates to a peak parking demand of 19 spaces for the proposed 5,802 SF medical office building, which is exceeded as designed. As such, it is the opinion of this firm that the proposed parking supply will be sufficient to support the anticipated parking demand of the project and the Board can feel comfortable granting the variance.

It is proposed to provide parking stalls with dimensions of 9'x18', which does not satisfy the Ordinance's minimum requirement of 10'x18' and a variance is requested. It should be noted that industry standards recommend stall widths of between 8'9" and 9' and a length of 18' for high-turnover land uses such as medical office buildings, which is met as designed. As such, the Board can feel comfortable granting the variance.

The Ordinance also sets forth a minimum loading requirement of 1 loading space for every building occupied by public, semipublic, office, laboratory or commercial uses. The site as proposed does not provide a striped loading space and a waiver is requested. It should be noted that the anticipated on-site loading/unloading operation is anticipated to occur primarily via vans, with the maximum potential sized delivery vehicle being an SU-30 truck. In the infrequent situation where an SU-30 delivery occurs on-site it is anticipated that the truck will park along the southwesterly curbline, which provides approximately 46' of length, enough to adequately support an SU-30 for a quick/infrequent delivery. As such, the Board can feel comfortable granting the waiver.

## FINDINGS & CONCLUSIONS

### Findings

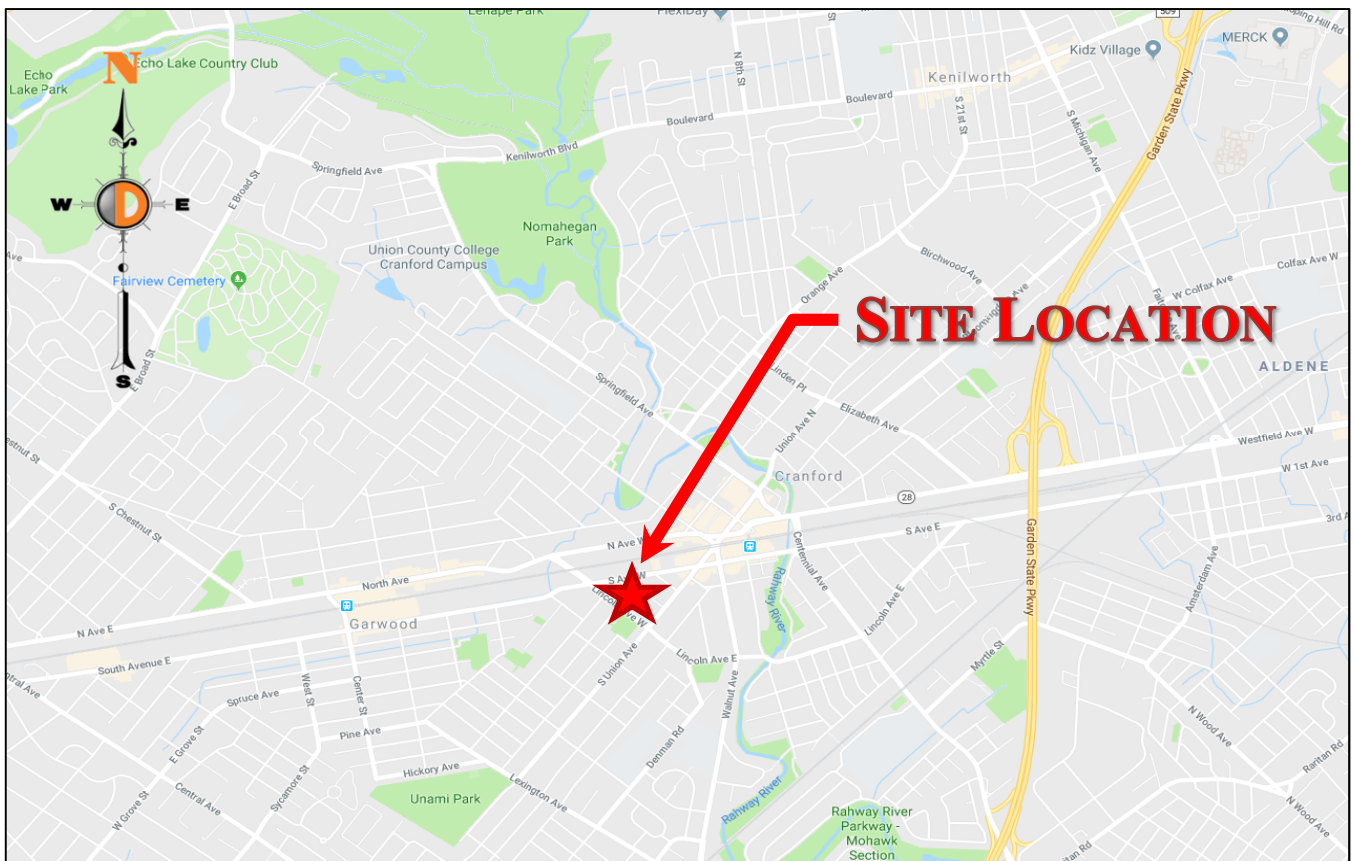
Based upon the detailed analyses as documented herein, the following findings are noted:

- The proposed 5,802 SF medical office building, is projected to generate 15 entering trips and 4 exiting trips during the weekday morning peak hour and 6 entering trips and 14 exiting trips during the evening peak hour that are “new” to the adjacent roadway network.
- The multiple driveways along South Avenue West (CR 610) and Lincoln Avenue West will be consolidated into a new full movement driveway along South Avenue West (CR 610) and a new full movement driveway along Lincoln Avenue West.
- With the addition of site generated traffic, the intersection of South Avenue West (CR 610) and Lincoln Avenue West (NJ Route 59) is anticipated to continue to operate at overall level of service “C” which is similar to the No Build condition. Additionally, each movement is anticipated to continue to operate at levels of service “D” or better with little to no change in delays between the No Build and Build conditions during the analyzed peak hours.
- As designed, all ingress movements at the proposed driveway along South Avenue West (CR 610) are anticipated to operate at level of service “A”, while all egress movements are anticipated to operate at levels of service “D” or better during the analyzed peak hours.
- As designed, all ingress movements at the proposed driveway along Lincoln Avenue West are anticipated to operate at level of service “A”, while all egress movements are anticipated to operate at levels of service “C” or better during the analyzed peak hours.
- As proposed, The Project’s site driveways and internal circulation have been designed to provide for safe and efficient movement of automobiles and large wheel base vehicles anticipated and are in accordance with industry standards.
- The proposed parking supply and design is sufficient to support the projected parking demand.

### Conclusions

Based upon our Traffic Impact Study as detailed in the body of this report, it is the professional opinion of Dynamic Traffic LLC that the adjacent street system (under the jurisdiction of the NJDOT, Union County, and the Township of Cranford) will not experience any significant degradation in operating conditions with the construction of The Project. The site driveways are located to provide safe and efficient access to the adjacent roadway system. The site plan as proposed provides for good circulation throughout the site and provides adequate parking to accommodate The Project’s needs.

**Appendix A**  
**Traffic Volume Figures**



Proposed Medical Office Building  
 Traffic Impact Study  
 4087-99-001T

**Figure 1**

**Site Location Map**

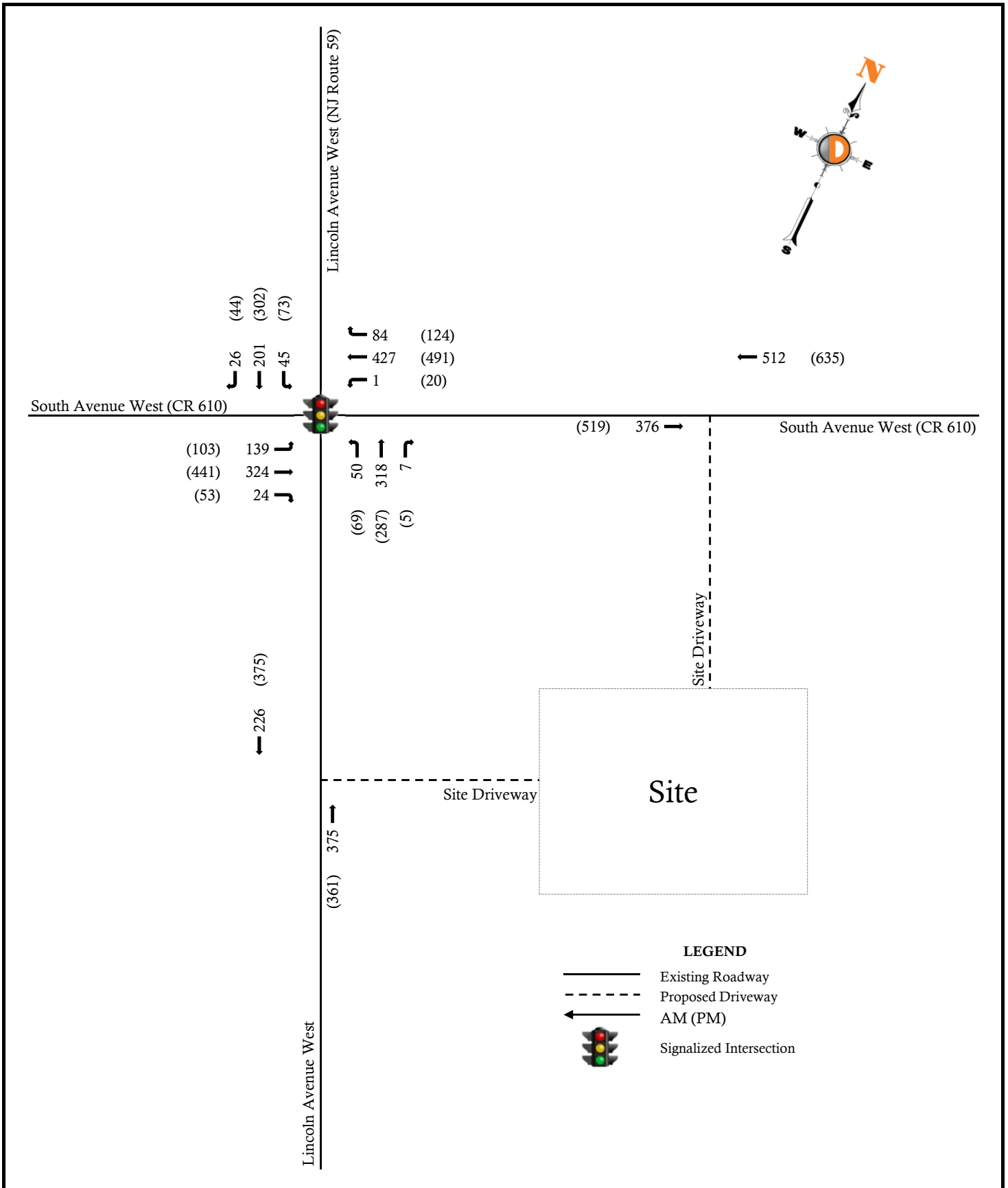


Figure 2

Existing Traffic Volumes

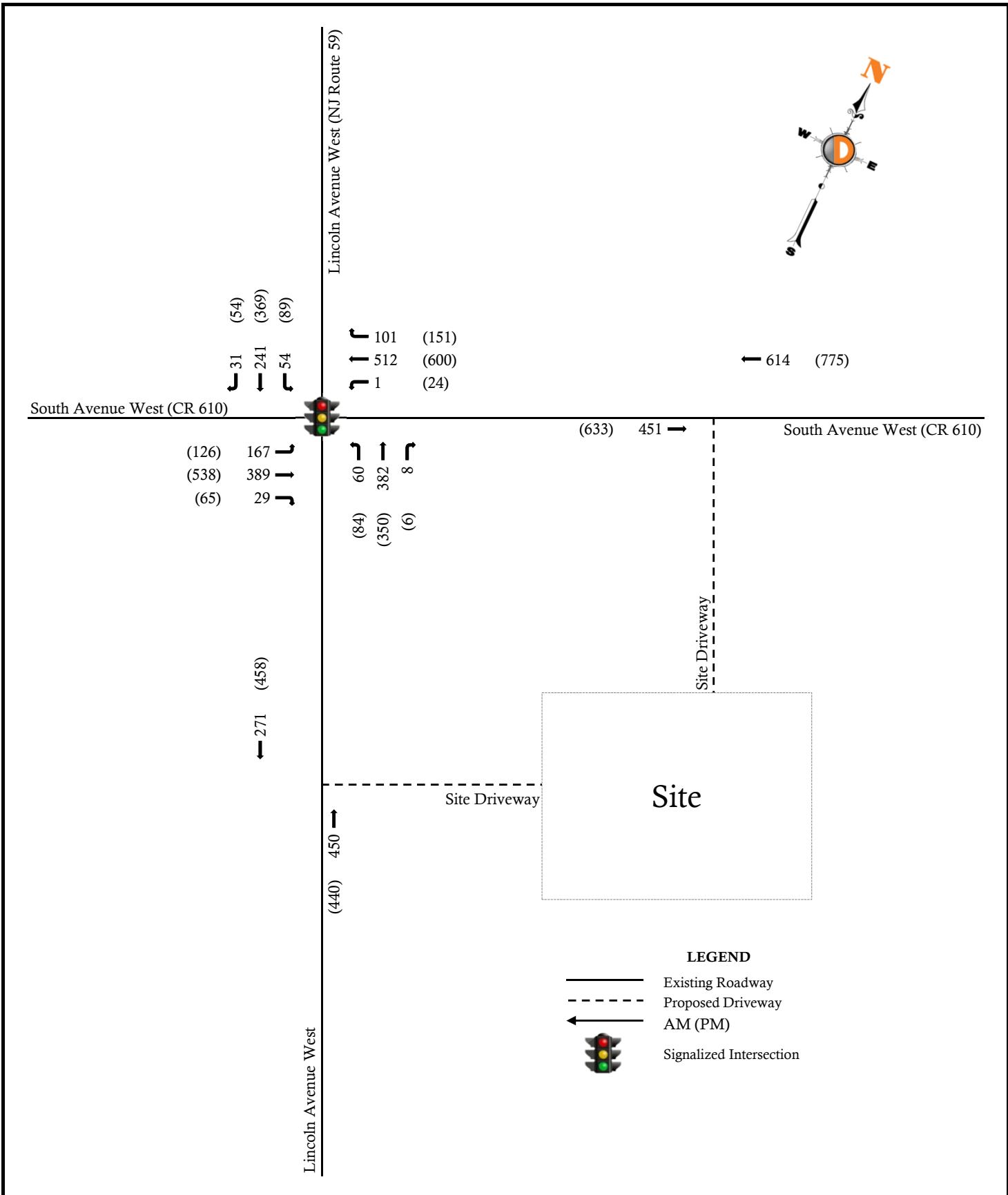
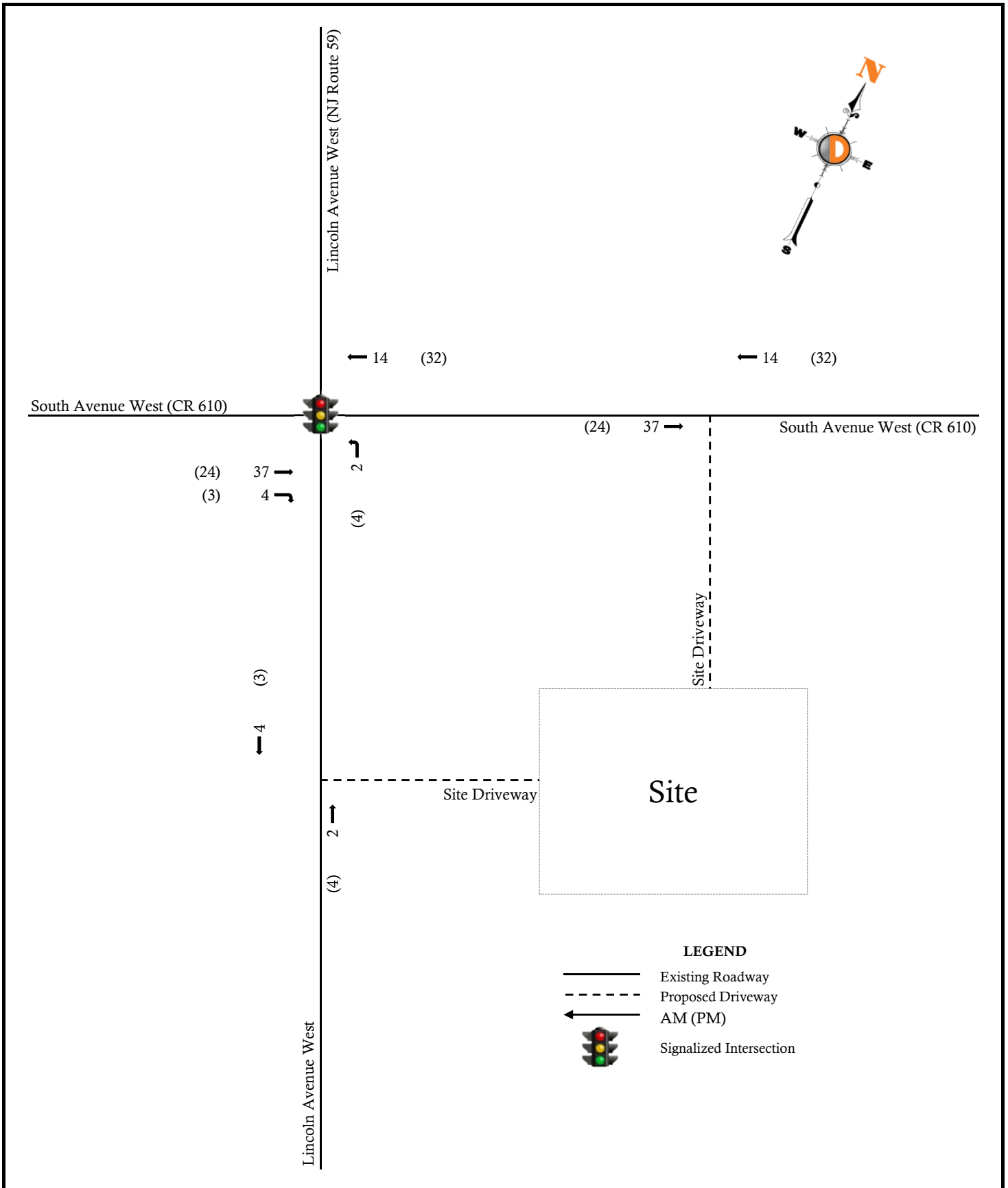
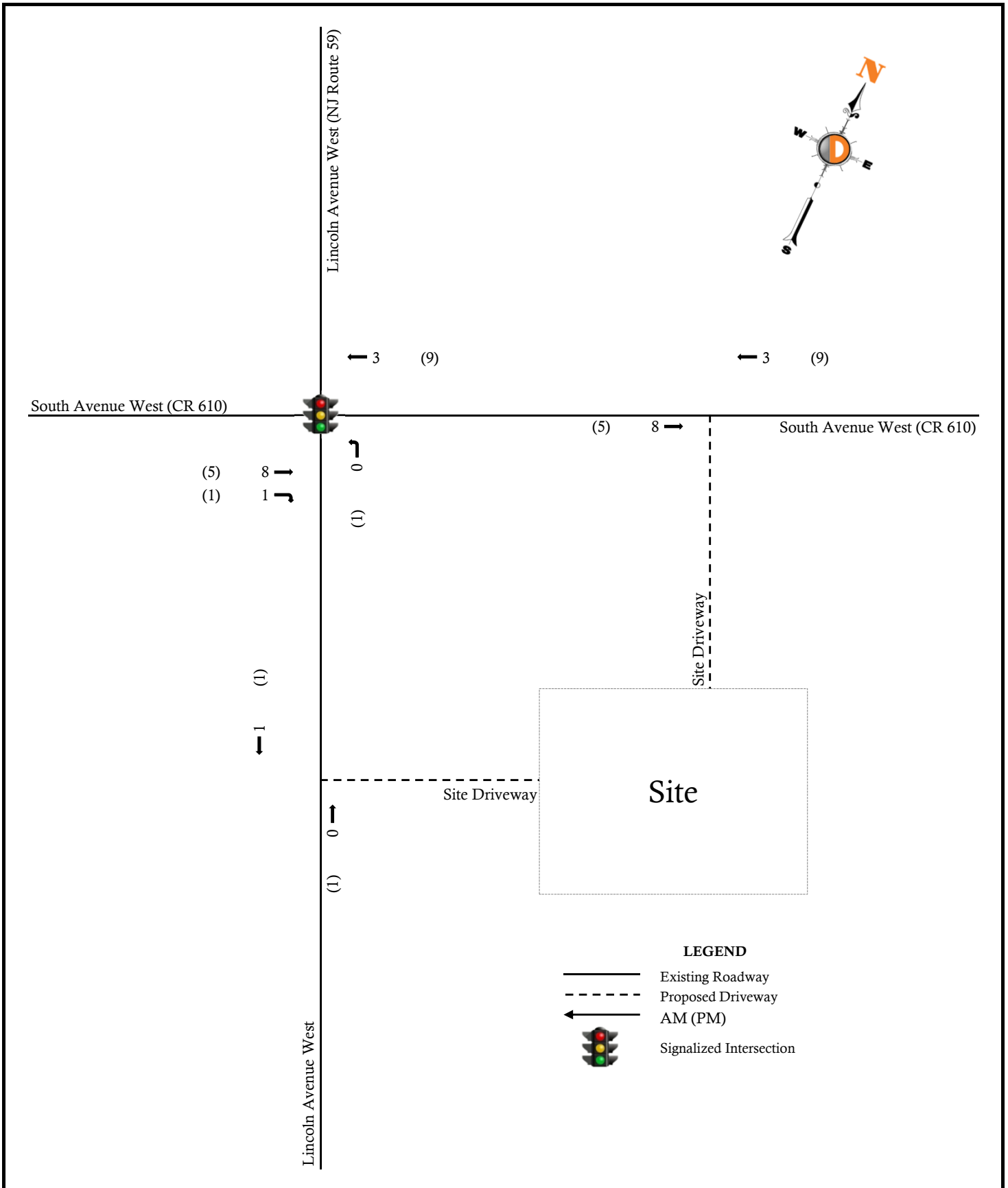


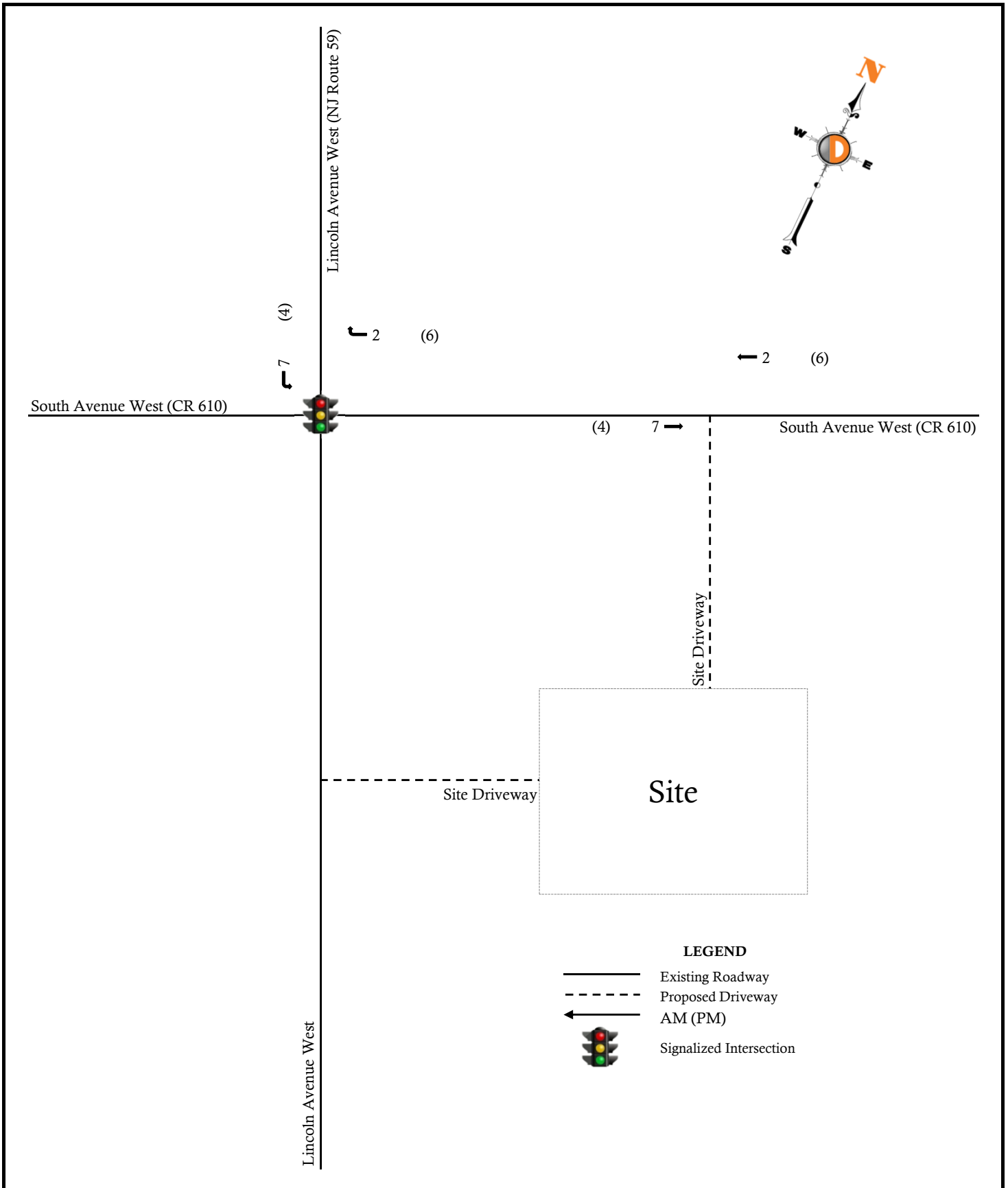
Figure 3

Adjusted Existing Traffic Volumes









Proposed Medical Office Building  
 Traffic Impact Study  
 4087-99-001T

Figure 6

Adjacent Development Traffic Volumes  
 [75-93 North Avenue - Garden Homes]

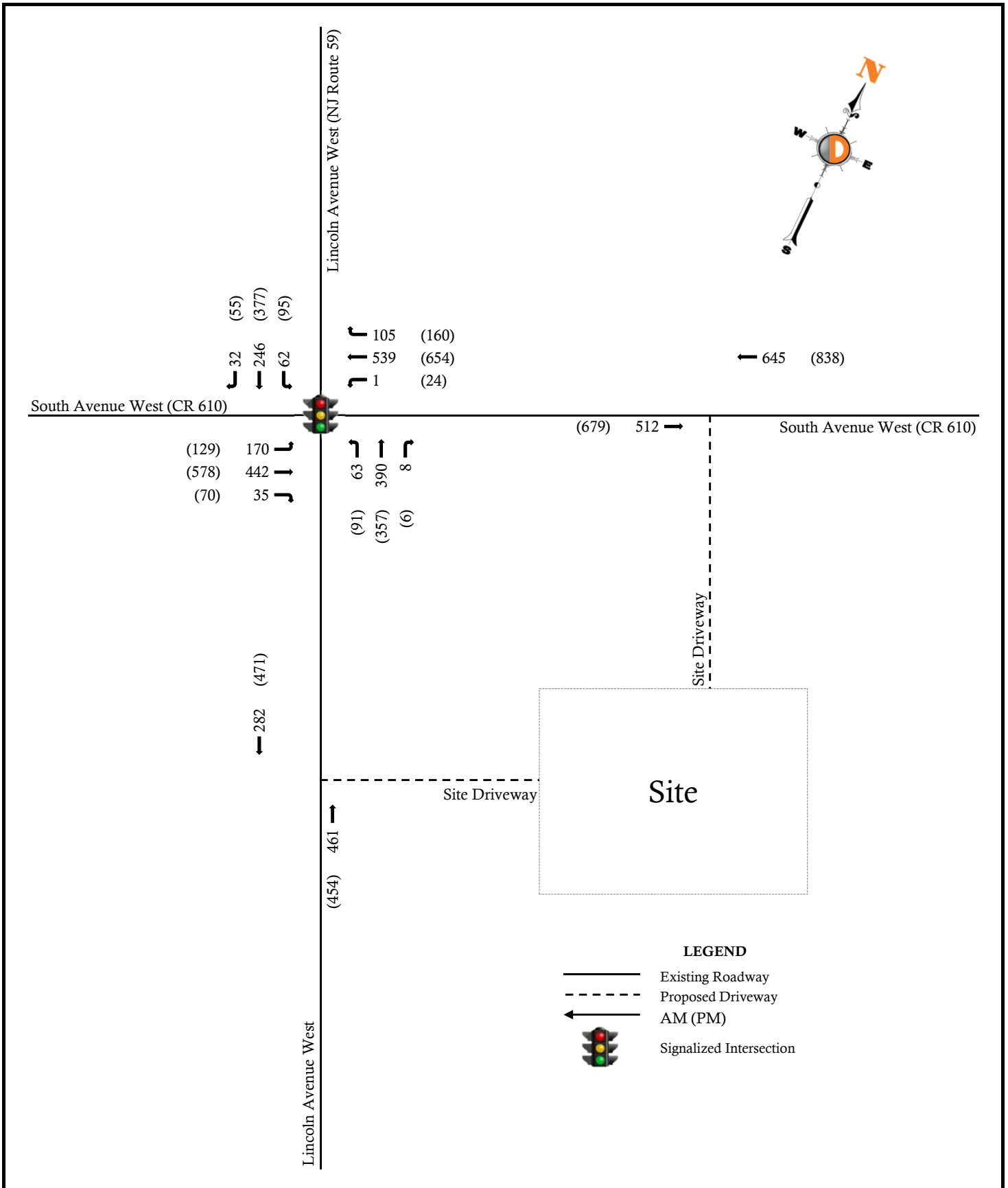
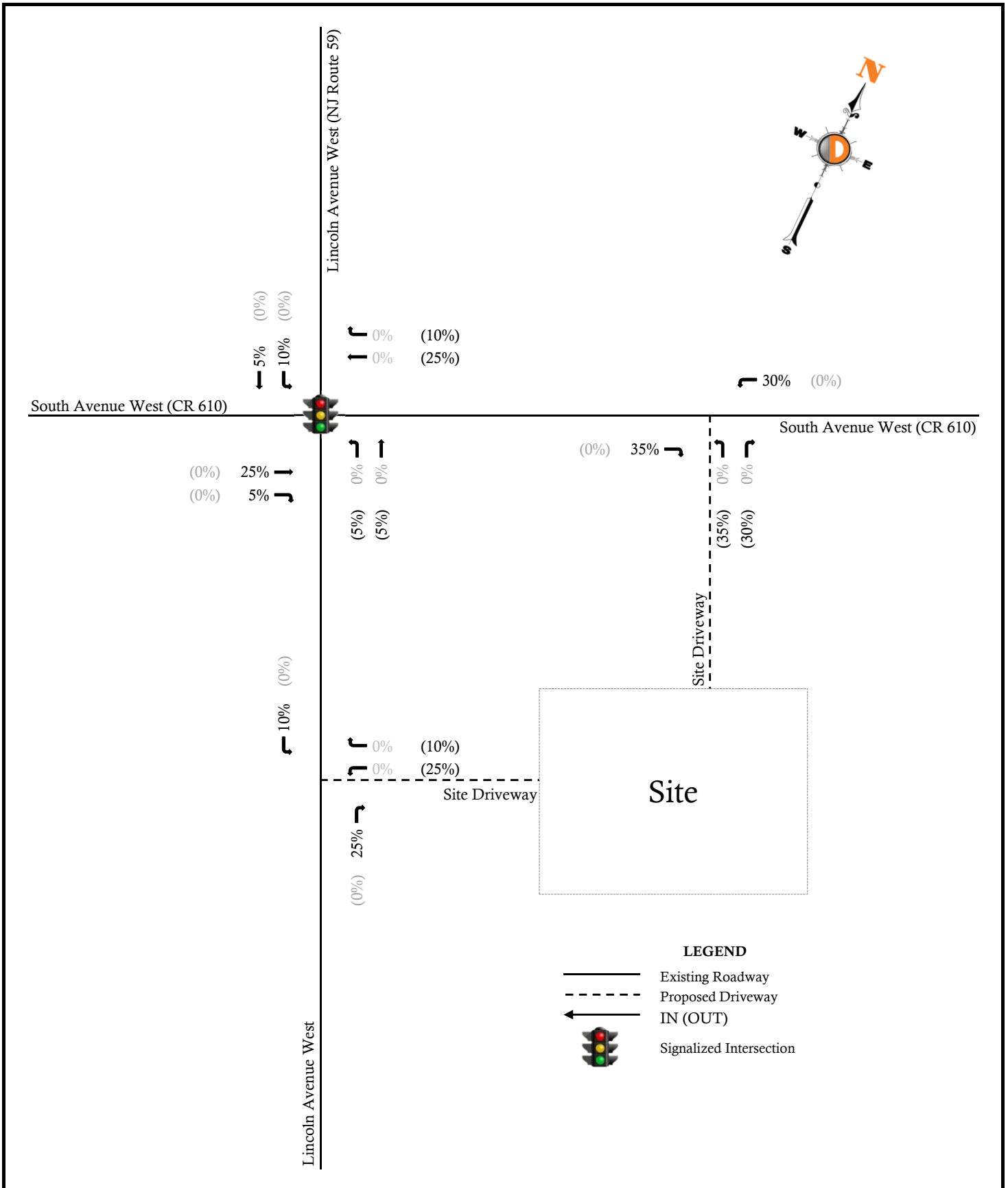
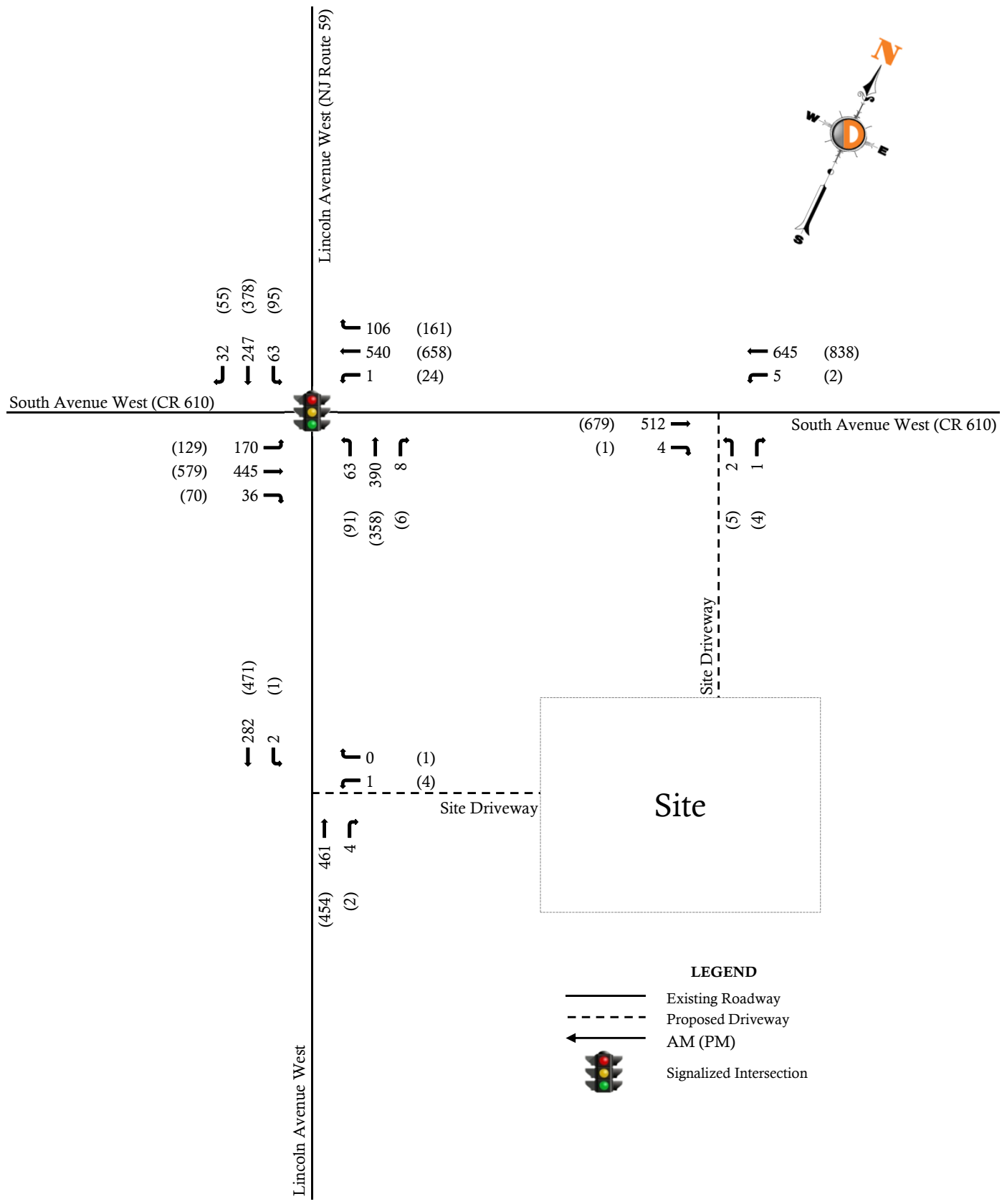


Figure 7

No Build Traffic Volumes







Proposed Medical Office Building  
 Traffic Impact Study  
 4087-99-001T

**Figure 10**

**Build Traffic Volumes**

**Appendix B**  
**Project Information**

# Dynamic Traffic, LLC

1904 Main Street, Lake Como, NJ 07719  
 245 Main Street - Suite 110, Chester, NJ 07930  
 732-681-0760

E/W: South Ave West  
 N/S: Lincoln Ave West  
 Town/County: Cranford/Union  
 Job #: 4087-99-001T

File Name : South Ave W & Lincoln Ave W - AMPM  
 Site Code : 00000000  
 Start Date : 1/11/2022  
 Page No : 1

## Groups Printed- Cars - Trucks (SU) - Trucks (TT)

Start Time	South Avenue West Eastbound					South Avenue West Westbound					Lincoln Avenue West Northbound					Lincoln Avenue West Southbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
07:00 AM	11	74	8	0	93	1	66	12	0	79	11	31	2	0	44	9	14	4	0	27	243
07:15 AM	12	67	6	0	85	0	76	16	0	92	12	58	0	0	70	3	14	4	0	21	268
07:30 AM	32	82	6	0	120	0	88	12	0	100	9	93	2	0	104	9	43	3	0	55	379
07:45 AM	57	94	6	0	157	0	114	31	0	145	12	101	0	0	113	7	54	2	0	63	478
Total	112	317	26	0	455	1	344	71	0	416	44	283	4	0	331	28	125	13	0	166	1368
08:00 AM	32	78	7	0	117	1	108	14	0	123	16	88	5	0	109	17	66	9	0	92	441
08:15 AM	18	70	5	0	93	0	117	27	0	144	13	36	0	0	49	12	38	12	0	62	348
08:30 AM	22	74	7	0	103	1	88	14	0	103	18	72	1	0	91	9	53	4	0	66	363
08:45 AM	15	83	5	0	103	0	116	26	0	142	13	74	1	0	88	15	41	8	0	64	397
Total	87	305	24	0	416	2	429	81	0	512	60	270	7	0	337	53	198	33	0	284	1549
*** BREAK ***																					
04:30 PM	27	110	21	0	158	6	126	15	0	147	14	63	0	0	77	16	60	9	0	85	467
04:45 PM	24	126	17	0	167	9	114	25	0	148	20	63	2	0	85	26	74	12	0	112	512
Total	51	236	38	0	325	15	240	40	0	295	34	126	2	0	162	42	134	21	0	197	979
05:00 PM	24	109	19	0	152	4	117	37	0	158	11	57	1	0	69	14	71	12	0	97	476
05:15 PM	30	106	9	0	145	5	134	29	0	168	21	95	1	0	117	19	73	8	0	100	530
05:30 PM	25	100	8	0	133	2	126	33	0	161	17	72	1	0	90	14	84	12	0	110	494
05:45 PM	18	81	8	0	107	3	107	17	0	127	30	76	0	0	106	11	58	13	0	82	422
Total	97	396	44	0	537	14	484	116	0	614	79	300	3	0	382	58	286	45	0	389	1922
06:00 PM	21	84	16	0	121	7	93	23	0	123	22	57	4	0	83	20	41	16	0	77	404
06:15 PM	13	76	10	0	99	2	110	31	0	143	16	52	0	0	68	16	36	5	0	57	367
Grand Total	381	1414	158	0	1953	41	1700	362	0	2103	255	1088	20	0	1363	217	820	133	0	1170	6589
Apprch %	19.5	72.4	8.1	0		1.9	80.8	17.2	0		18.7	79.8	1.5	0		18.5	70.1	11.4	0		
Total %	5.8	21.5	2.4	0	29.6	0.6	25.8	5.5	0	31.9	3.9	16.5	0.3	0	20.7	3.3	12.4	2	0	17.8	
Cars	379	1387	156	0	1922	41	1675	356	0	2072	254	1084	20	0	1358	213	819	133	0	1165	6517
% Cars	99.5	98.1	98.7	0	98.4	100	98.5	98.3	0	98.5	99.6	99.6	100	0	99.6	98.2	99.9	100	0	99.6	98.9
Trucks (SU)	2	25	2	0	29	0	25	5	0	30	1	3	0	0	4	4	1	0	0	5	68
% Trucks (SU)	0.5	1.8	1.3	0	1.5	0	1.5	1.4	0	1.4	0.4	0.3	0	0	0.3	1.8	0.1	0	0	0.4	1
Trucks (TT)	0	2	0	0	2	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	4
% Trucks (TT)	0	0.1	0	0	0.1	0	0	0.3	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0.1







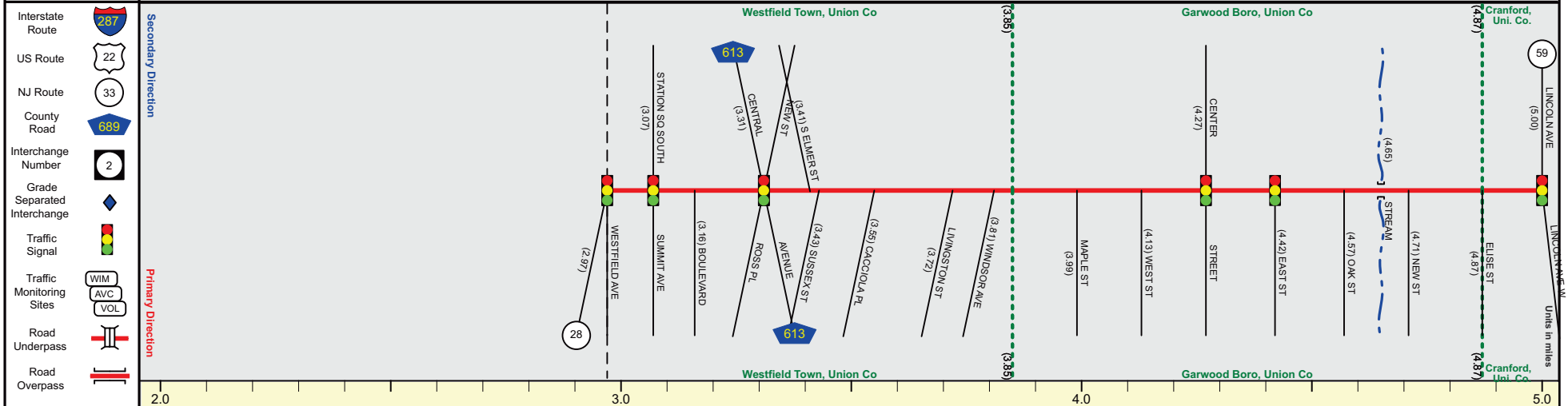


# UNION COUNTY 610 (West to East)

Mile Posts: 2.970 - 5.000



Pavement	
Shoulder	
Number of Lanes	
Speed Limit	
Street Name	



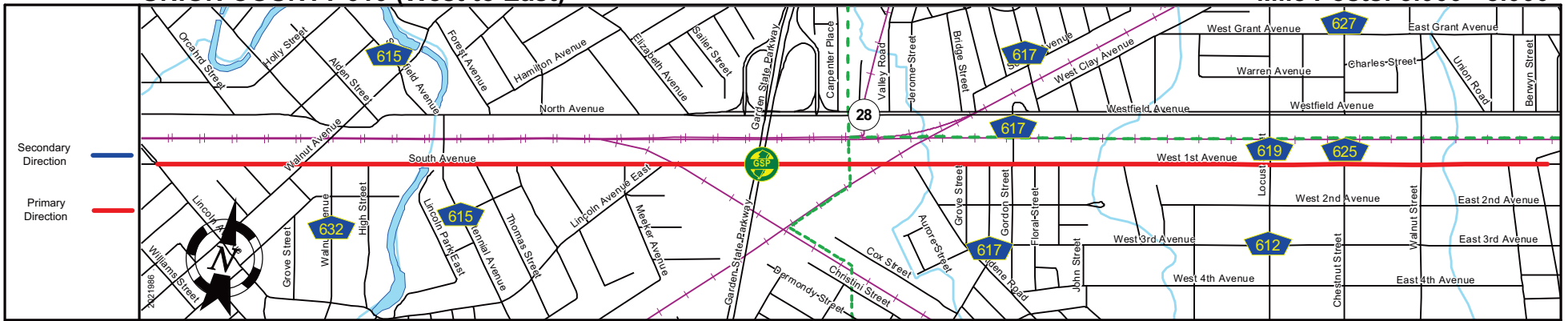
Street Name		South Avenue			
Jurisdiction		County			
Functional Class		Urban Minor Arterial			
Federal Aid - NHS Sy		STP			
Control Section					
Speed Limit		30	35		
Number of Lanes		3	2	4	2
Med. Type			None		
Med. Width			0		
Pavement			40		
Shoulder			0		
Traffic Volume					
Traffic Sta. ID					
Structure No.					
Enlarged Views					

SRI = 2000610\_\_

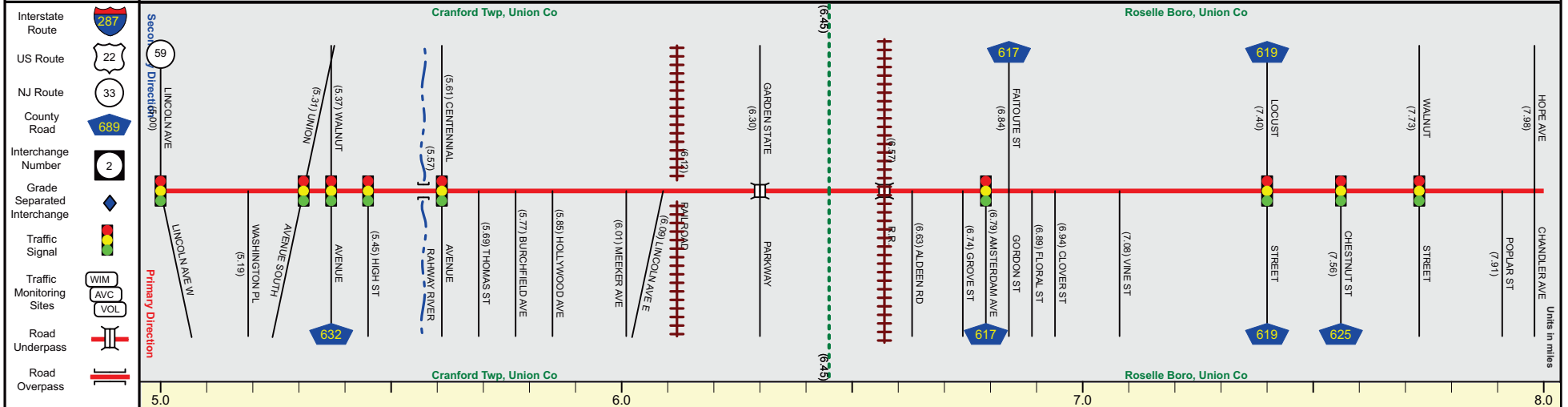
Date last inventoried: April 2012

# UNION COUNTY 610 (West to East)

# Mile Posts: 5.000 - 8.000



Pavement	
Shoulder	
Number of Lanes	
Speed Limit	
Street Name	



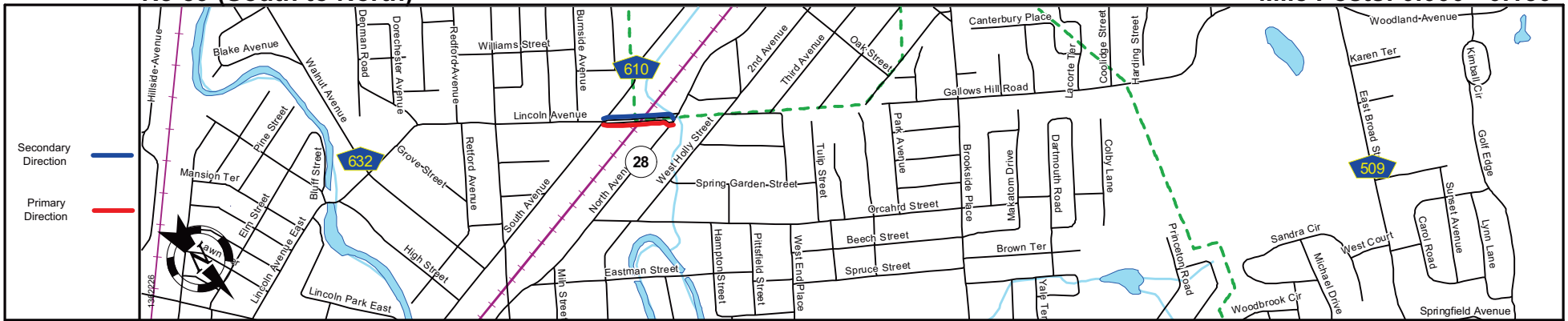
Street Name	South Avenue		West 1st Avenue		East 1st Avenue
Jurisdiction	Cranford Twp, Union Co		Roselle Boro, Union Co		Union Co
Functional Class	Urban Minor Arterial				
Federal Aid - NHS Sy	STP				
Control Section					
Speed Limit	35	30	35	40	25
Number of Lanes			2		4
Med. Type	None				
Med. Width	0				
Pavement			40		28
Shoulder			0		6
Traffic Volume	13,594 (2016)				
Traffic Sta. ID	162003				
Structure No.	2003028				
Enlarged Views					

SRI = 2000610\_\_

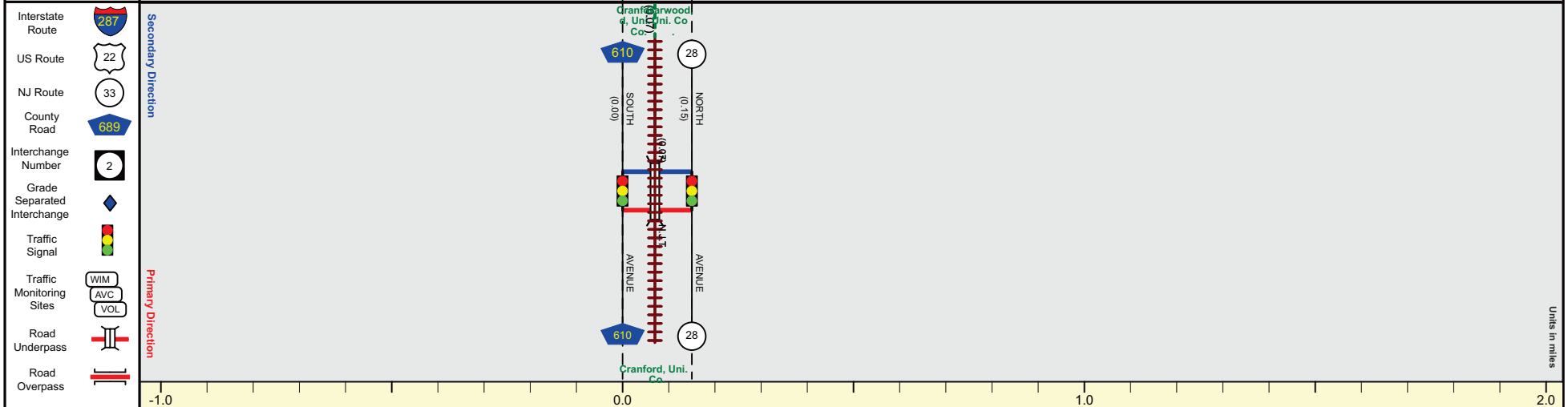
Date last inventoried: April 2012

# NJ 59 (South to North)

Mile Posts: 0.000 - 0.150



Pavement	24
Shoulder	0
Number of Lanes	2
Speed Limit	25
Street Name	Lincoln Avenue



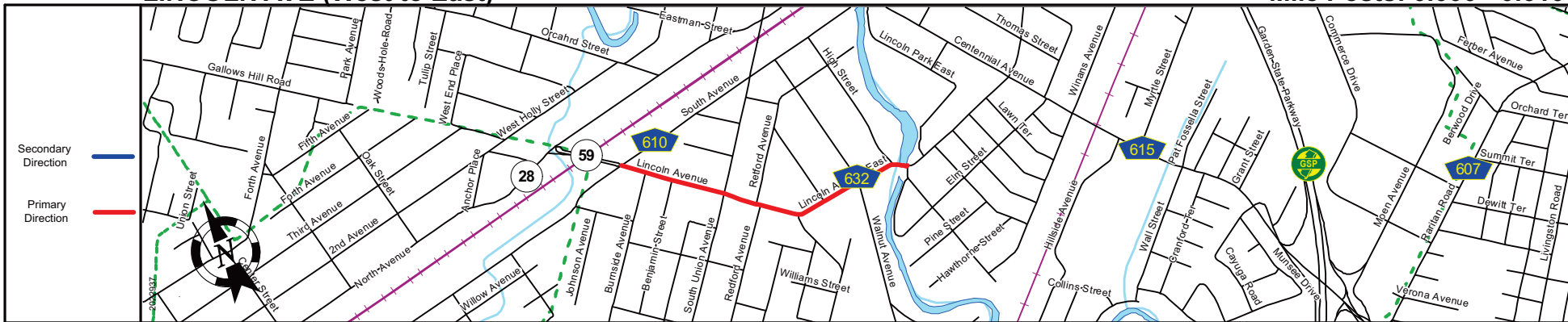
Street Name	Lincoln Avenue
Jurisdiction	N.J.D.O.T.
Functional Class	Urban Major Collector
Federal Aid - NHS Sy	STP
Control Section	2009
Speed Limit	25
Number of Lanes	2
Med. Type	Curbed
Med. Width	VAR
Pavement	24
Shoulder	0
Traffic Volume	
Traffic Sta. ID	
Structure No.	
Enlarged Views	

SRI = 0000059\_\_

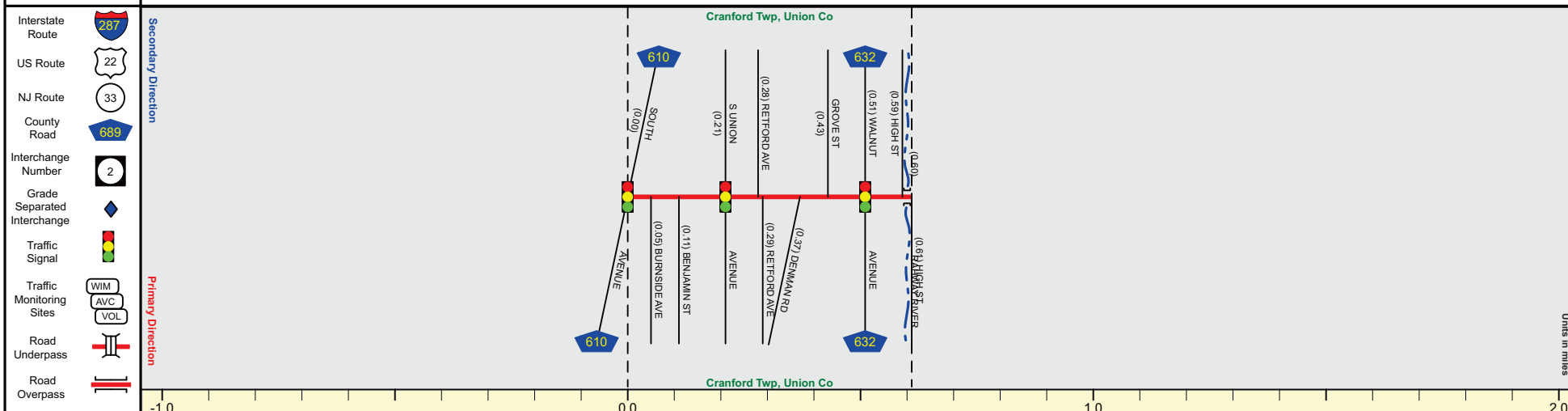
Date last inventoried: June 2014

# LINCOLN AVE (West to East)

Mile Posts: 0.000 - 0.610



Pavement	
Shoulder	
Number of Lanes	
Speed Limit	
Street Name	



Street Name	Lincoln Avenue	Lincoln Avenue East
Jurisdiction	Municipal	
Functional Class	Urban Major Collector	
Federal Aid - NHS Sy	STP	
Control Section		
Speed Limit	25	
Number of Lanes	2	
Med. Type	None	
Med. Width	0	
Pavement	24	
Shoulder	6	
Traffic Volume	9,343 (2017)	
Traffic Sta. ID	3-4-673	
Structure No.	2003-45	
Enlarged Views		

SRI = 20031365\_\_

Date last inventoried: April 2012

**TRAFFIC ENGINEERING - ELECTRICAL PROJECT**

Number 336

Job No.	2009101-4651
Memo to	DISTRICT #2 - Mr. I. Anderson
Attention	

Route No.	50 (Lincoln Ave.) & South Ave.
Location	Cranford Twp., - Union Co.
Date	MAR 15 1982

This is to confirm verbal authorization given to employ the attached revised timing schedule and operation at the above captioned intersection:

70 SECOND BACKGROUND CYCLE

	<u>GREEN</u>		<u>YELLOW</u>		<u>ALL-RED</u>		<u>RED</u>		<u>OFFSET</u>
	<u>SEC.</u>	<u>%</u>	<u>SEC.</u>	<u>%</u>	<u>SEC.</u>	<u>%</u>	<u>SEC.</u>	<u>%</u>	
Route 59 (Lincoln Ave.)	21.0	30	3.5	5	2.1	3	43.4	62	0*
South Ave.	37.8	54	3.5	5	2.1	3	26.6	38	

\* The offset is measured from the beginning of yellow to South Ave. traffic at this intersection.

The manual control is to be removed.

AUTHORIZATION: George A. Strathern

Reference:

Date Completed	March 29, 1982
By	Bruce Wilson

Copies: Blue  
Pink  
Green  
White

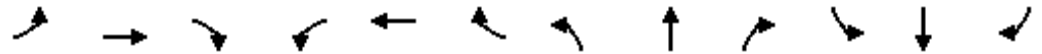
ORIGINAL SIGNED  
J. M. PITTMAN

TITLE: Chief, Bureau of Electrical Operations



**Appendix C**  
**Capacity Analysis**

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	167	389	29	1	512	101	60	382	8	54	241	31
Future Volume (vph)	167	389	29	1	512	101	60	382	8	54	241	31
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	16	16	16	16	16	16	12	12	12	13	13	13
Grade (%)		0%			0%			1%			1%	
Storage Length (ft)	0		0	0		0	0		150	0		0
Storage Lanes	0		0	0		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.993			0.978			0.997			0.983	
Flt Protected		0.986					0.950			0.950		
Satd. Flow (prot)	0	2278	0	0	2301	0	1985	2083	0	1972	2122	0
Flt Permitted		0.600			0.999		0.438			0.242		
Satd. Flow (perm)	0	1386	0	0	2299	0	915	2083	0	502	2122	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			22			1			9	
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		403			1565			1099			649	
Travel Time (s)		7.9			30.5			30.0			17.7	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	1%	3%	0%	0%	1%	2%	0%	0%	0%	4%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	680	0	0	713	0	70	453	0	63	316	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Minimum Split (s)	43.4	43.4		43.4	43.4		26.6	26.6		26.6	26.6	
Total Split (s)	43.4	43.4		43.4	43.4		26.6	26.6		26.6	26.6	
Total Split (%)	62.0%	62.0%		62.0%	62.0%		38.0%	38.0%		38.0%	38.0%	
Maximum Green (s)	37.8	37.8		37.8	37.8		21.0	21.0		21.0	21.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6		5.6	5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		37.8			37.8		21.0	21.0		21.0	21.0	
Actuated g/C Ratio		0.54			0.54		0.30	0.30		0.30	0.30	
v/c Ratio		0.91			0.57		0.26	0.72		0.42	0.49	
Control Delay		33.4			12.6		21.7	30.0		29.9	22.7	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		33.4			12.6		21.7	30.0		29.9	22.7	
LOS		C			B		C	C		C	C	
Approach Delay		33.4			12.6			28.8			23.9	
Approach LOS		C			B			C			C	
Queue Length 50th (ft)		241			182		23	173		22	107	
Queue Length 95th (ft)		#437			254		52	254		55	168	
Internal Link Dist (ft)		323			1485			1019			569	

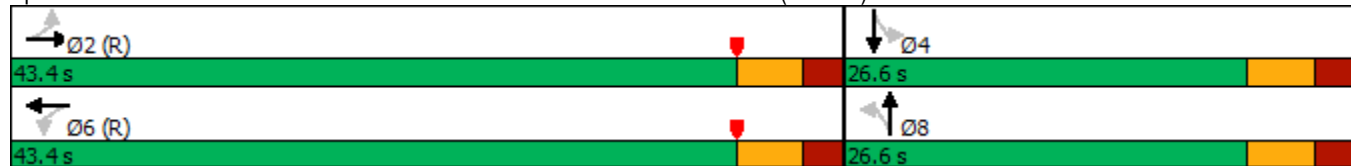


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)												
Base Capacity (vph)		751			1251		274	625		150	642	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.91			0.57		0.26	0.72		0.42	0.49	

Intersection Summary

Area Type: Other  
 Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection  
 Natural Cycle: 70  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.91  
 Intersection Signal Delay: 24.3  
 Intersection LOS: C  
 Intersection Capacity Utilization 117.8%  
 ICU Level of Service H  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Lincoln Avenue West/Route 59 & South Avenue West (CR 610)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	126	538	65	24	600	151	84	350	6	89	369	54
Future Volume (vph)	126	538	65	24	600	151	84	350	6	89	369	54
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	16	16	16	16	16	16	12	12	12	13	13	13
Grade (%)		0%			0%			1%			1%	
Storage Length (ft)	0		0	0		0	0		150	0		0
Storage Lanes	0		0	0		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.974			0.998			0.981	
Flt Protected		0.991			0.998		0.950			0.950		
Satd. Flow (prot)	0	2309	0	0	2291	0	1985	2085	0	2031	2118	0
Flt Permitted		0.716			0.967		0.253			0.353		
Satd. Flow (perm)	0	1668	0	0	2220	0	529	2085	0	755	2118	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			27			1			11	
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		403			1565			1099			649	
Travel Time (s)		7.9			30.5			30.0			17.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	2%	0%	1%	1%	0%	0%	0%	1%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	767	0	0	816	0	88	374	0	94	445	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Minimum Split (s)	43.4	43.4		43.4	43.4		26.6	26.6		26.6	26.6	
Total Split (s)	43.4	43.4		43.4	43.4		26.6	26.6		26.6	26.6	
Total Split (%)	62.0%	62.0%		62.0%	62.0%		38.0%	38.0%		38.0%	38.0%	
Maximum Green (s)	37.8	37.8		37.8	37.8		21.0	21.0		21.0	21.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6		5.6	5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		37.8			37.8		21.0	21.0		21.0	21.0	
Actuated g/C Ratio		0.54			0.54		0.30	0.30		0.30	0.30	
v/c Ratio		0.85			0.67		0.56	0.60		0.42	0.69	
Control Delay		24.9			14.7		37.1	25.6		26.5	27.7	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		24.9			14.7		37.1	25.6		26.5	27.7	
LOS		C			B		D	C		C	C	
Approach Delay		24.9			14.7			27.8			27.5	
Approach LOS		C			B			C			C	
Queue Length 50th (ft)		255			226		32	136		32	164	
Queue Length 95th (ft)		#488			344		#91	218		74	260	
Internal Link Dist (ft)		323			1485			1019			569	

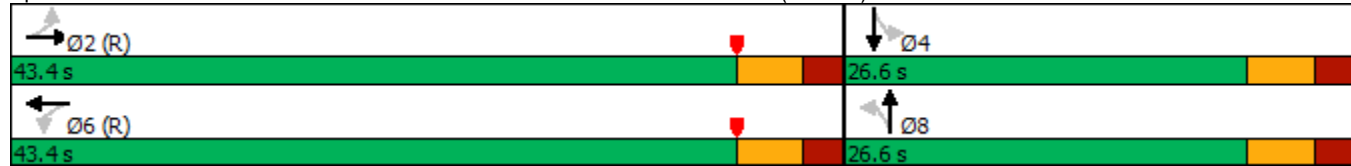


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)												
Base Capacity (vph)		905			1211		158	626		226	643	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.85			0.67		0.56	0.60		0.42	0.69	

Intersection Summary

Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	70
Offset:	0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection
Natural Cycle:	70
Control Type:	Pretimed
Maximum v/c Ratio:	0.85
Intersection Signal Delay:	22.7
Intersection LOS:	C
Intersection Capacity Utilization	130.3%
ICU Level of Service	H
Analysis Period (min)	15
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 10: Lincoln Avenue West/Route 59 & South Avenue West (CR 610)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	442	35	1	539	105	63	390	8	62	246	32
Future Volume (vph)	170	442	35	1	539	105	63	390	8	62	246	32
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	16	16	16	16	16	16	12	12	12	13	13	13
Grade (%)		0%			0%			1%			1%	
Storage Length (ft)	0		0	0		0	0		150	0		0
Storage Lanes	0		0	0		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.993			0.978			0.997			0.983	
Flt Protected		0.987					0.950			0.950		
Satd. Flow (prot)	0	2280	0	0	2301	0	1985	2083	0	1972	2122	0
Flt Permitted		0.602			0.999		0.427			0.229		
Satd. Flow (perm)	0	1391	0	0	2299	0	892	2083	0	475	2122	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			22			1			10	
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		403			1565			1099			649	
Travel Time (s)		7.9			30.5			30.0			17.7	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	1%	3%	0%	0%	1%	2%	0%	0%	0%	4%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	753	0	0	750	0	73	462	0	72	323	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Minimum Split (s)	43.4	43.4		43.4	43.4		26.6	26.6		26.6	26.6	
Total Split (s)	43.4	43.4		43.4	43.4		26.6	26.6		26.6	26.6	
Total Split (%)	62.0%	62.0%		62.0%	62.0%		38.0%	38.0%		38.0%	38.0%	
Maximum Green (s)	37.8	37.8		37.8	37.8		21.0	21.0		21.0	21.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6		5.6	5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		37.8			37.8		21.0	21.0		21.0	21.0	
Actuated g/C Ratio		0.54			0.54		0.30	0.30		0.30	0.30	
v/c Ratio		1.00			0.60		0.27	0.74		0.51	0.50	
Control Delay		51.9			13.1		22.1	30.7		35.4	22.8	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		51.9			13.1		22.1	30.7		35.4	22.8	
LOS		D			B		C	C		D	C	
Approach Delay		51.9			13.1			29.5			25.1	
Approach LOS		D			B			C			C	
Queue Length 50th (ft)		296			195		24	177		25	110	
Queue Length 95th (ft)		#507			273		54	261		#68	171	
Internal Link Dist (ft)		323			1485			1019			569	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)												
Base Capacity (vph)		753			1251		267	625		142	643	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		1.00			0.60		0.27	0.74		0.51	0.50	

**Intersection Summary**

Area Type: Other  
 Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection  
 Natural Cycle: 80  
 Control Type: Pretimed  
 Maximum v/c Ratio: 1.00  
 Intersection Signal Delay: 30.7  
 Intersection LOS: C  
 Intersection Capacity Utilization 118.2%  
 ICU Level of Service H  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

**Splits and Phases: 10: Lincoln Avenue West/Route 59 & South Avenue West (CR 610)**



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	578	70	24	654	160	91	357	6	95	377	55
Future Volume (vph)	129	578	70	24	654	160	91	357	6	95	377	55
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	16	16	16	16	16	16	12	12	12	13	13	13
Grade (%)		0%			0%			1%			1%	
Storage Length (ft)	0		0	0		0	0		150	0		0
Storage Lanes	0		0	0		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.974			0.998			0.981	
Flt Protected		0.992			0.999		0.950			0.950		
Satd. Flow (prot)	0	2311	0	0	2294	0	1985	2085	0	2031	2118	0
Flt Permitted		0.697			0.967		0.239			0.342		
Satd. Flow (perm)	0	1624	0	0	2220	0	499	2085	0	731	2118	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			26			1			11	
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		403			1565			1099			649	
Travel Time (s)		7.9			30.5			30.0			17.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	2%	0%	1%	1%	0%	0%	0%	1%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	818	0	0	881	0	96	382	0	100	455	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Minimum Split (s)	43.4	43.4		43.4	43.4		26.6	26.6		26.6	26.6	
Total Split (s)	43.4	43.4		43.4	43.4		26.6	26.6		26.6	26.6	
Total Split (%)	62.0%	62.0%		62.0%	62.0%		38.0%	38.0%		38.0%	38.0%	
Maximum Green (s)	37.8	37.8		37.8	37.8		21.0	21.0		21.0	21.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6		5.6	5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		37.8			37.8		21.0	21.0		21.0	21.0	
Actuated g/C Ratio		0.54			0.54		0.30	0.30		0.30	0.30	
v/c Ratio		0.93			0.73		0.64	0.61		0.46	0.71	
Control Delay		34.2			16.2		45.0	25.9		28.1	28.4	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		34.2			16.2		45.0	25.9		28.1	28.4	
LOS		C			B		D	C		C	C	
Approach Delay		34.2			16.2			29.7			28.3	
Approach LOS		C			B			C			C	
Queue Length 50th (ft)		296			256		36	139		35	168	
Queue Length 95th (ft)		#551			392		#107	224		80	266	
Internal Link Dist (ft)		323			1485			1019			569	



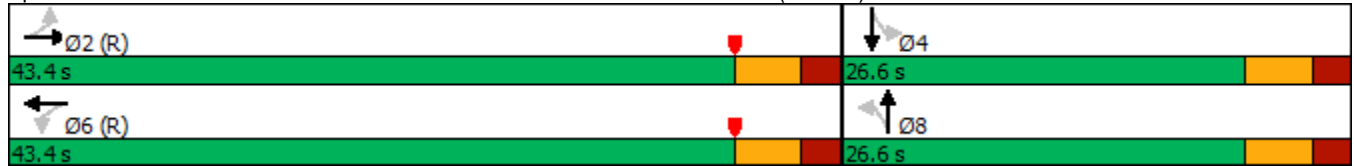


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)												
Base Capacity (vph)		882			1210		149	626		219	643	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.93			0.73		0.64	0.61		0.46	0.71	

Intersection Summary

Area Type: Other  
 Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection  
 Natural Cycle: 75  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.93  
 Intersection Signal Delay: 26.4 Intersection LOS: C  
 Intersection Capacity Utilization 136.1% ICU Level of Service H  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Lincoln Avenue West/Route 59 & South Avenue West (CR 610)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	445	36	1	540	106	63	390	8	63	247	32
Future Volume (vph)	170	445	36	1	540	106	63	390	8	63	247	32
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	16	16	16	16	16	16	12	12	12	13	13	13
Grade (%)		0%			0%			1%			1%	
Storage Length (ft)	0		0	0		0	0		150	0		0
Storage Lanes	0		0	0		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.993			0.978			0.997			0.983	
Flt Protected		0.987					0.950			0.950		
Satd. Flow (prot)	0	2280	0	0	2301	0	1985	2083	0	1972	2122	0
Flt Permitted		0.602			0.999		0.426			0.229		
Satd. Flow (perm)	0	1391	0	0	2299	0	890	2083	0	475	2122	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			22			1			9	
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		403			333			187			649	
Travel Time (s)		7.9			6.5			5.1			17.7	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	1%	3%	0%	0%	1%	2%	0%	0%	0%	4%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	757	0	0	752	0	73	462	0	73	324	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Minimum Split (s)	43.4	43.4		43.4	43.4		26.6	26.6		26.6	26.6	
Total Split (s)	43.4	43.4		43.4	43.4		26.6	26.6		26.6	26.6	
Total Split (%)	62.0%	62.0%		62.0%	62.0%		38.0%	38.0%		38.0%	38.0%	
Maximum Green (s)	37.8	37.8		37.8	37.8		21.0	21.0		21.0	21.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6		5.6	5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		37.8			37.8		21.0	21.0		21.0	21.0	
Actuated g/C Ratio		0.54			0.54		0.30	0.30		0.30	0.30	
v/c Ratio		1.00			0.60		0.27	0.74		0.51	0.50	
Control Delay		52.9			13.1		22.1	30.7		35.9	22.9	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		52.9			13.1		22.1	30.7		35.9	22.9	
LOS		D			B		C	C		D	C	
Approach Delay		52.9			13.1			29.5			25.3	
Approach LOS		D			B			C			C	
Queue Length 50th (ft)		~302			196		24	177		26	110	
Queue Length 95th (ft)		#511			274		54	261		#72	172	
Internal Link Dist (ft)		323			253			107			569	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)												
Base Capacity (vph)		754			1251		267	625		142	642	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		1.00			0.60		0.27	0.74		0.51	0.50	

Intersection Summary

Area Type: Other  
 Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection  
 Natural Cycle: 80  
 Control Type: Pretimed  
 Maximum v/c Ratio: 1.00  
 Intersection Signal Delay: 31.0      Intersection LOS: C  
 Intersection Capacity Utilization 118.4%      ICU Level of Service H  
 Analysis Period (min) 15  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Lincoln Avenue West/Route 59 & South Avenue West (CR 610)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	579	70	24	658	161	91	358	6	95	378	55
Future Volume (vph)	129	579	70	24	658	161	91	358	6	95	378	55
Ideal Flow (vphpl)	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
Lane Width (ft)	16	16	16	16	16	16	12	12	12	13	13	13
Grade (%)		0%			0%			1%			1%	
Storage Length (ft)	0		0	0		0	0		150	0		0
Storage Lanes	0		0	0		0	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.974			0.998			0.981	
Flt Protected		0.992			0.999		0.950			0.950		
Satd. Flow (prot)	0	2333	0	0	2316	0	1985	2085	0	2051	2118	0
Flt Permitted		0.695			0.968		0.238			0.340		
Satd. Flow (perm)	0	1634	0	0	2244	0	497	2085	0	734	2118	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			26			1			11	
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		403			333			187			649	
Travel Time (s)		7.9			6.5			5.1			17.7	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	819	0	0	887	0	96	383	0	100	456	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Minimum Split (s)	43.4	43.4		43.4	43.4		26.6	26.6		26.6	26.6	
Total Split (s)	43.4	43.4		43.4	43.4		26.6	26.6		26.6	26.6	
Total Split (%)	62.0%	62.0%		62.0%	62.0%		38.0%	38.0%		38.0%	38.0%	
Maximum Green (s)	37.8	37.8		37.8	37.8		21.0	21.0		21.0	21.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.1	2.1		2.1	2.1		2.1	2.1		2.1	2.1	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		5.6			5.6		5.6	5.6		5.6	5.6	
Lead/Lag												
Lead-Lag Optimize?												
Act Effct Green (s)		37.8			37.8		21.0	21.0		21.0	21.0	
Actuated g/C Ratio		0.54			0.54		0.30	0.30		0.30	0.30	
v/c Ratio		0.92			0.73		0.64	0.61		0.45	0.71	
Control Delay		33.5			16.1		45.1	25.9		27.9	28.5	
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay		33.5			16.1		45.1	25.9		27.9	28.5	
LOS		C			B		D	C		C	C	
Approach Delay		33.5			16.1			29.8			28.4	
Approach LOS		C			B			C			C	
Queue Length 50th (ft)		294			258		36	140		35	169	
Queue Length 95th (ft)		#550			391		#107	224		80	267	
Internal Link Dist (ft)		323			253			107			569	

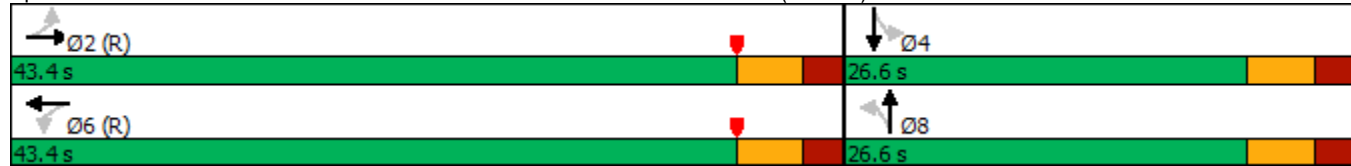


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)												
Base Capacity (vph)		887			1223		149	626		220	643	
Starvation Cap Reductn		0			0		0	0		0	0	
Spillback Cap Reductn		0			0		0	0		0	0	
Storage Cap Reductn		0			0		0	0		0	0	
Reduced v/c Ratio		0.92			0.73		0.64	0.61		0.45	0.71	

Intersection Summary

Area Type: Other  
 Cycle Length: 70  
 Actuated Cycle Length: 70  
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection  
 Natural Cycle: 75  
 Control Type: Pretimed  
 Maximum v/c Ratio: 0.92  
 Intersection Signal Delay: 26.2  
 Intersection LOS: C  
 Intersection Capacity Utilization 136.4%  
 ICU Level of Service H  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 10: Lincoln Avenue West/Route 59 & South Avenue West (CR 610)



Intersection						
Int Delay, s/veh	0.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	512	4	5	645	2	1
Future Vol, veh/h	512	4	5	645	2	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	3	2	2	1	2	2
Mvmt Flow	569	4	6	717	2	1
Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	573	0	1300	571
Stage 1	-	-	-	-	571	-
Stage 2	-	-	-	-	729	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1000	-	178	520
Stage 1	-	-	-	-	565	-
Stage 2	-	-	-	-	477	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1000	-	176	520
Mov Cap-2 Maneuver	-	-	-	-	176	-
Stage 1	-	-	-	-	565	-
Stage 2	-	-	-	-	472	-
Approach	EB	WB	NB			
HCM Control Delay, s	0	0.1	21.2			
HCM LOS						C
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	226	-	-	1000	-	
HCM Lane V/C Ratio	0.015	-	-	0.006	-	
HCM Control Delay (s)	21.2	-	-	8.6	0	
HCM Lane LOS	C	-	-	A	A	
HCM 95th %tile Q(veh)	0	-	-	0	-	

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	679	1	2	838	5	4
Future Vol, veh/h	679	1	2	838	5	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	707	1	2	873	5	4

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	708	0	1585 708
Stage 1	-	-	-	-	708 -
Stage 2	-	-	-	-	877 -
Critical Hdwy	-	-	4.1	-	6.4 6.2
Critical Hdwy Stg 1	-	-	-	-	5.4 -
Critical Hdwy Stg 2	-	-	-	-	5.4 -
Follow-up Hdwy	-	-	2.2	-	3.5 3.3
Pot Cap-1 Maneuver	-	-	900	-	120 438
Stage 1	-	-	-	-	492 -
Stage 2	-	-	-	-	410 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	900	-	120 438
Mov Cap-2 Maneuver	-	-	-	-	120 -
Stage 1	-	-	-	-	492 -
Stage 2	-	-	-	-	408 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	26.5
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	177	-	-	900	-
HCM Lane V/C Ratio	0.053	-	-	0.002	-
HCM Control Delay (s)	26.5	-	-	9	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	TT		TT			TT
Traffic Vol, veh/h	1	0	461	4	2	282
Future Vol, veh/h	1	0	461	4	2	282
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	1	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	0	2	2	0
Mvmt Flow	1	0	562	5	2	344
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	913	565	0	0	567	0
Stage 1	565	-	-	-	-	-
Stage 2	348	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	304	524	-	-	1005	-
Stage 1	569	-	-	-	-	-
Stage 2	715	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	303	524	-	-	1005	-
Mov Cap-2 Maneuver	303	-	-	-	-	-
Stage 1	569	-	-	-	-	-
Stage 2	714	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	16.9	0	0.1			
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	303	1005	-	
HCM Lane V/C Ratio	-	-	0.004	0.002	-	
HCM Control Delay (s)	-	-	16.9	8.6	0	
HCM Lane LOS	-	-	C	A	A	
HCM 95th %tile Q(veh)	-	-	0	0	-	



Intersection						
Int Delay, s/veh	0.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	4	1	454	2	1	471
Future Vol, veh/h	4	1	454	2	1	471
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	1	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	4	1	504	2	1	523
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1030	505	0	0	506	0
Stage 1	505	-	-	-	-	-
Stage 2	525	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	261	571	-	-	1069	-
Stage 1	610	-	-	-	-	-
Stage 2	598	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	261	571	-	-	1069	-
Mov Cap-2 Maneuver	261	-	-	-	-	-
Stage 1	610	-	-	-	-	-
Stage 2	597	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	17.5	0	0			
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	293	1069	-	
HCM Lane V/C Ratio	-	-	0.019	0.001	-	
HCM Control Delay (s)	-	-	17.5	8.4	0	
HCM Lane LOS	-	-	C	A	A	
HCM 95th %tile Q(veh)	-	-	0.1	0	-	